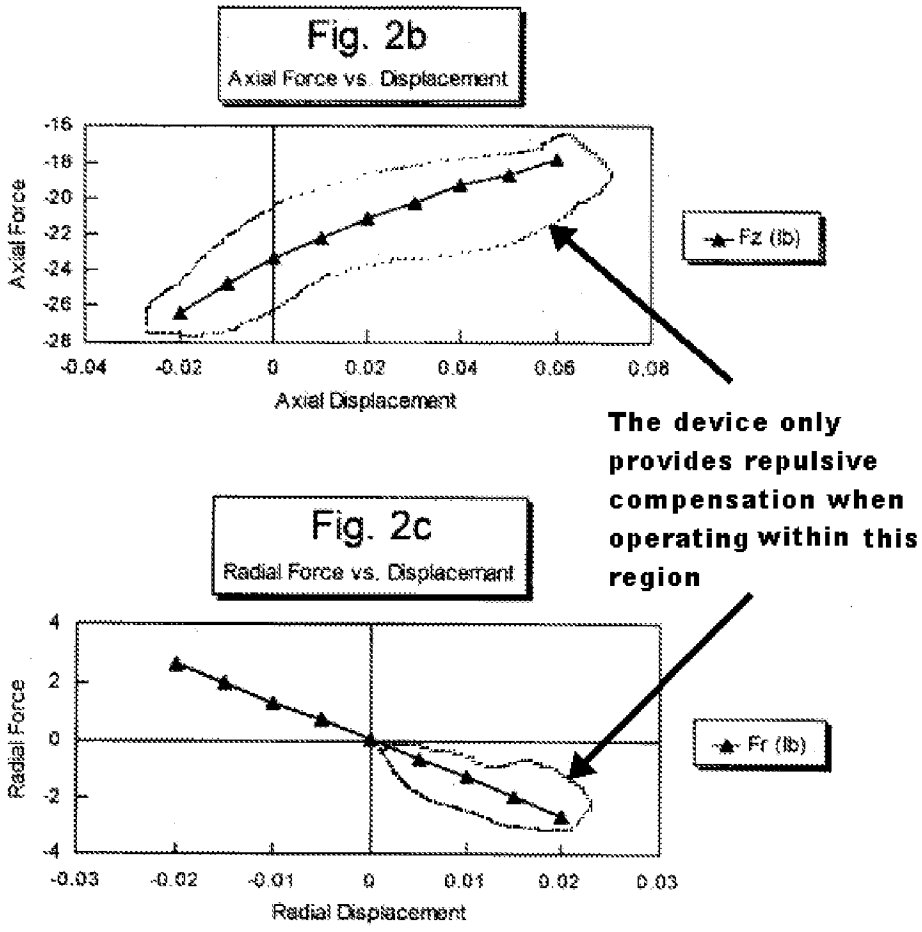
DETAILED ACTION

Response to Arguments

Applicant's arguments filed 11/6/2009 have been fully considered but they are not persuasive. Applicant asserts that, "Imlach discloses a system wherein there is a repulsive magnetic field interaction and an attractive of the magnetic field interaction (see column 4, lines 9-14) simultaneously. Therefore, Imlach fails to recite a device as recited in amended independent claims 1 and 20." The Examiner disagrees with this assertion because the device of Imlach, US 5894181 **could operate with only repulsive compensation** when the external forces cause the displacement as shown along the circled regions in the embodiment of figure 2a. Note that this embodiment could exhibit only a repulsive compensation force depending on the position of the rotor (see figure 2b and 2c when operating the circled position). Finally the compensation force is always repulsive to an Fext along the axial displacement vector.



As to Tanaka et al., JP 404078315A, note that during normal operation, (absent a large external vibration or shock), the rotor and magnetic thrust bearing S do not touch and a gap either A or B is maintained as well as repulsive compensation, hence the claim limitations are met.

As to ONO ET AL., US 5360470, note the rejection includes a clear statement as to how the references can be combined. Furthermore, applicants argument to the effect

that the present invention achieves “high thrust load”; “high load capacity and “high current” as set forth on bottom half of page 11 of the remarks which applicant argues the combination Imlach, US 5894181 in view of ONO ET AL., US 5360470 fails to address. However these terms are relative terms which would carry little patentable weight, if claimed, because they are comparative terms with which a comparison is not made, hence they would not clearly define the meets and bounds of the invention. Finally, these limitations are not found in the claims.

As to claim 11, the examiner is not persuaded by applicant's argument because case law has established that to select a known material on the basis of its suitability for the intended use is a matter of obvious design choice. In other words, since the materials, i.e., carbon steel and mild steel are already known for use in a rotor and stator, respectively, these limitations cannot be the basis for patentability since the suitability of the materials is already known in the prior art. Thus this rejection is proper and is maintained.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 12, 15-18, 20, 22, 23 and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by Imlach, US 5894181. Imlach, US 5894181 shows:

A compact (this is a relative term and carries little patentable weight, because any size can be considered "compact" next to a larger size) thrust load enhancement device for a rotor-bearing system, comprising

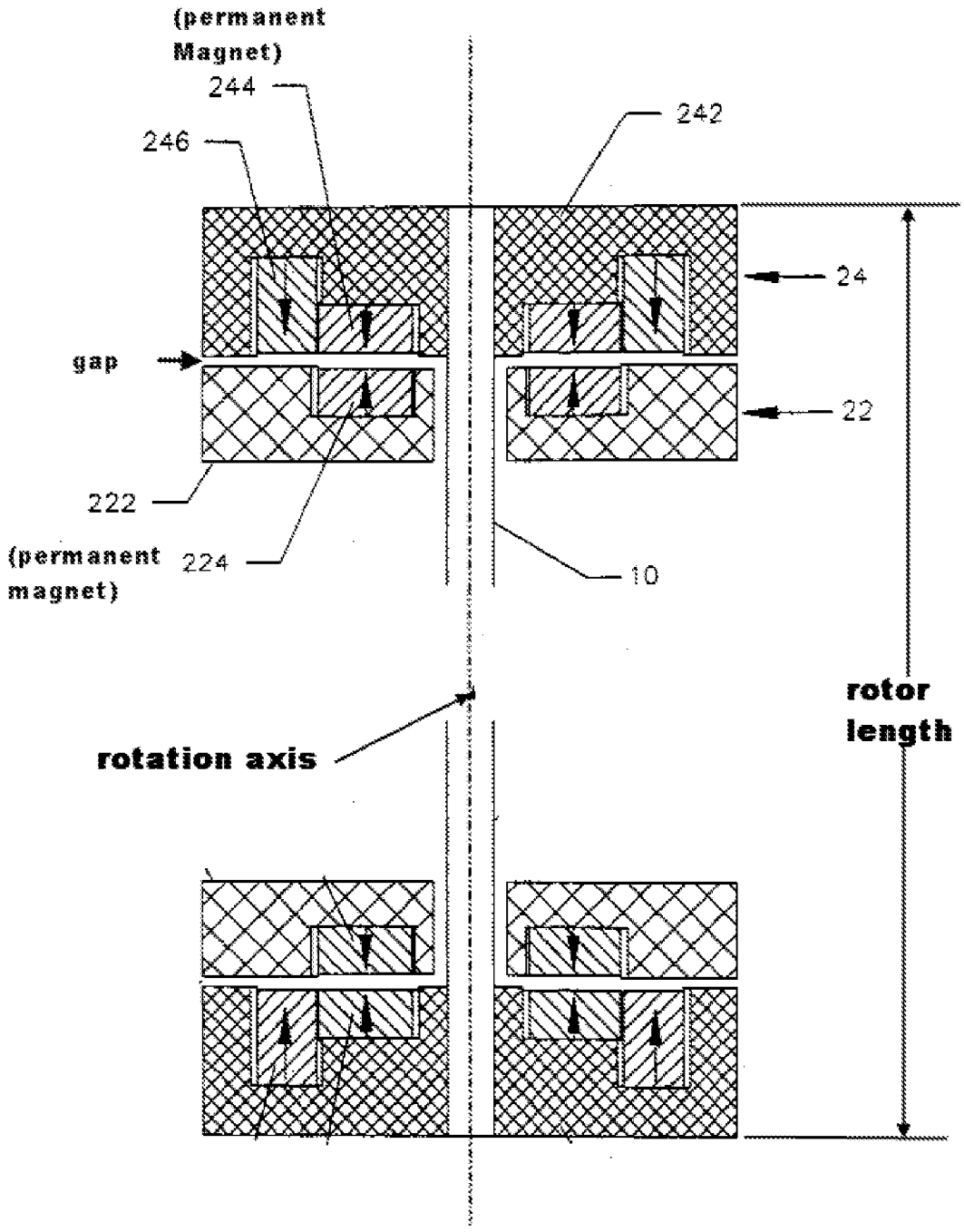
a stator 22 mounted on a rotation axis of the rotor-bearing system;

a rotor 24 mounted on the rotation axis of the rotor-bearing system and separated from said stator by a magnetic air gap on the rotation axis; and

at least one permanent magnet 244 mounted on the rotation axis of the rotor bearing system (see modified figure 2a labeled below); said at least one permanent magnet being fixed to a first on of : i) said stator and ii) said rotor, and being separated from a second one of : i) said stator and ii) said rotor by said magnetic air gap;

wherein the rotor length needs not be modified (see modified figure 2a labeled below, an note that if permanent magnets 224. 244 and 246 were removed the rotor length remains the same) to accommodate said thrust load enhancement device, and a minimum (again, this is a relative term and carries little patentable weight, because any size can be considered minimum based on the desired axial thrust force desired and the intensity of the magnet field generated per unit volume) volume of magnet is used; said at least one permanent magnet, said stator, said rotor and said magnetic air gap forming a magnetic circuit generating a compensation force between said rotor and said stator that opposes an external force Fext, said compensation force being either

attractive or repulsive depending on said external force Fext. (inherent since the gap remain substantially constant)


(permanent
Magnet)
244
246
242
24
gap
22
222
(permanent
magnet)
224
10
rotor
length
rotation axis

Re claim 2, note that shaft 10 of Imlach, US 5894181 is disposed in a vertical orientation therefor the effects of gravitational force is balanced.

Re claims 3 and 22, note permanent magnet 224, supra.

Re claim 15, note the device is at the end of the rotor shaft.

Claims 12, 16, 17, 18 and 30 recite are limitations related to intended use of the device with no additional structural apparatus limitations or characterizations recited of the device itself. Furthermore, Imlach, US 5894181 shows the rotor being supported in a vertical orientations thus acting against shaft weight.

Re claim 23, see the labeled figure supra.

Claims 1, 15, 20, 23 and 33 are rejected under 35 U.S.C. 102(b) as being anticipated by Tanaka et al., JP 404078315A. Tanaka et al., JP 404078315A shows:

A compact (this is a relative term and carries little patentable weight, because any size can be considered "compact" next to a larger size) thrust load enhancement device for a rotor-bearing system, comprising

a stator (thrust magnetic bearing S, see page 8 of translation) mounted on a rotation axis of the rotor-bearing system;

a rotor (42A coupled to rotating sleeve 32, see figure 1 below) mounted on the rotation axis of the rotor-bearing system and separated from said stator by

a magnetic air gap (either A or B, see page 9 of translation) on the rotation axis; and

at least one permanent magnet (41 or 44, see page 8 of translation) mounted on the rotation axis of the rotor bearing system (see figure 1 labeled below); said at least one permanent magnet being fixed to a first on of : i) said stator and ii) said rotor, and being separated from a second one of : i) said stator and ii) said rotor by said magnetic air gap (either A or B, see page 9 of translation);

wherein the rotor length needs not be modified (see figure 1 labeled below, and note that if permanent magnets 41 and 44 were removed the rotor length remains the same) to accommodate said thrust load enhancement device, and a minimum (again, this is a relative term and carries little patentable weight, because any size can be considered minimum based on the desired axial thrust force desired and the intensity of the magnet field generated per unit volume) volume of magnet is used; said at least one permanent magnet (41 or 44, see page 8 of translation), said stator, said rotor and said magnetic air gap forming a magnetic circuit generating a compensation force between said rotor and said stator that opposes an external force Fext, said compensation force being either attractive or repulsive depending on said external force Fext. (inherent since the gap remain substantially constant, except for large external vibration or shock as pointed out by applicant on page 11 of the response of 2/4/2009, and again on page 11 in the response of 11/06/2009, however during normal operation this

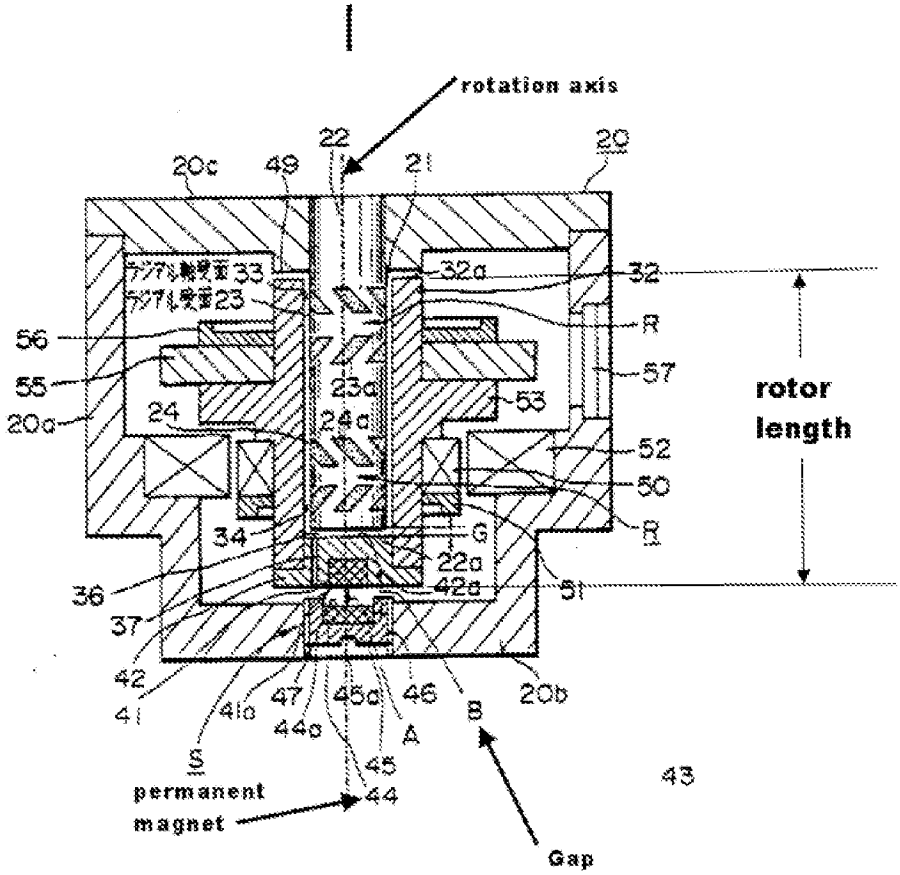
feature is present in the device of Tanaka et al., JP 404078315A) Finally, the force would always be repulsive in the axial direction even during contact when the gap would be nil.

Re claim 20, note that "high-speed" is a relative term and carries little patentable weight, because any speed can be considered "high" next to a slower speed. Furthermore, the limitation of, "… of an outer diameter similar to that of the bearing system…" is inherent because the outer diameter of the rotor **is part** of the rotor-bearing system. Finally the limitation of, "…said compensation force being attractive or repulsive to oppose an external force Fext depending on the external force Fext…", is inherently met because the force would inherently be repulsive to counteract the effect of gravity and maintain the rotor on the support shaft 22.

Re claim 15, note the device is at the end of the rotor shaft.

Re claim 23, note permanent magnet 41 and permanent 44 as shown in the figure 1, separated by an air gap.

Re claim 33, note hydrodynamic bearing system comprising 23a and 24a.



Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 8, 9, 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imlach, US 5894181 in view of ONO ET AL., US 5360470. Imlach,

US 5894181 discloses the invention substantially as claimed as set forth in the rejection of claim 1, supra. Imlach, US 5894181 does not expressly disclose, "…further comprising a spacer to adjust said first and second magnetic air gaps." or "... further comprising a piezoelectric actuator mounted in said stator." ONO ET AL., US 5360470 discloses use of a piezoelectric spacer 70p, for the purpose of adjusting the magnetic gap of a magnetic bearing to ensure efficient operation. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to include an adjustable piezoelectric spacer to moveably support any of the magnets of the device of Imlach, US 5894181 as taught by ONO ET AL., US 5360470. One of ordinary skill in the art would have been motivated to do this to maintain the efficient operation of the device.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Imlach, US 5894181 in view of GUY, CN 1120256A and THOMAS, US 2782354. Imlach, US 5894181 discloses the invention substantially as claimed as set forth in the rejection of claim 1, supra. Imlach, US 5894181 does not expressly disclose, "…wherein said rotor is made of carbon steel and said stator is made of mild steel." GUY, CN 1120256A and THOMAS, US 2782354 disclose, respectively the use of a rotor made of carbon steel to reduce costs and use of a mild steel stator to avoid flux crossing laminations see column 2, lines 9-14. Furthermore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to choose a suitable and desired

material, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. See *In Re Leshin*, 125 USPQ 416. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use a rotor of carbon steel and a stator of mild steel in the device of Imlach, US 5894181. One of ordinary skill in the art would have been motivated to do this to reduce manufacturing costs and reduce reluctance in the magnetic path. In other words, since the materials, i.e., carbon steel and mild steel are already known for use in a rotor and stator, respectively, these limitations form the basis for patentability since the suitability of the materials is already known in the prior art.

Allowable Subject Matter

Claims 13, 14, 31, 32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The limitations of, "…further comprising force measurement devices to measure the compensation force." in combination with the remaining claimed structure is neither found nor fairly suggested in the prior art or any combination thereof as re claims 13 and 14.

The following is a statement of reasons for the indication of allowable subject matter: The limitations of, "…further comprising the step of providing force

measurement devices to measure the compensation force." in combination with the remaining claimed method is neither found nor fairly suggested in the prior art or any combination thereof as re claims 31 and 32.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID W. SCHEUERMANN whose telephone number is (571)272-2035.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Quyen Leung can be reached at (571) 272-8188. The fax phone numbers for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Quyen Leung/
Supervisory Patent Examiner, Art Unit 2834

/David W. Scheuermann/
Examiner, Art Unit 2834
1/13/2010